

# DATA SHEET

## **Introduction**

PowerMOS Transistors including  
TOPFETs and IGBTs

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### TYPE NUMBERS

Philips Power MOSFETs and related products can be grouped into three distinct type number schemes. The Type numbers are made up as follows:

#### a) Standard DMOS - 'BUKxxx' type numbers

The format is BUK prefix then a 3-digit 'type code' and a hyphen followed by a voltage and a single or two letter suffix.

The 3-digit 'type code' conform to the scheme shown in the table below. The first digit defines the technology, the second outline and the third indicates the approximate chip size. TOPFET's use a modified scheme where the second and third digits are chosen sequentially as each new type is released.

Example: BUK563-60A is a logic level FET in SOT404 outline~ with a size 3 chip, 60V rated maximum  $V_{DS}$  and top grade:  $R_{DS(on)}$ .

#### b) TrenchMOS™ Type Numbers

The TrenchMOS™ type numbering scheme system follows a similar scheme the standard DMOS range. Again the first digit after BUK refers to the technology: '7' for a standard level device and '9' for a logic level device. The second digit is again the package designation and follows the same relationship as the DMOS range. These are also shown in the table below. The major difference with the TrenchMOS™ numbering scheme is the use of the subsequent two digits to express the  $R_{DS(on)}$  maximum rating of the device in mΩ. TrenchMOS™ devices can

therefore be identified easily as they have a 4 digit 'type code' after the BUK prefix.

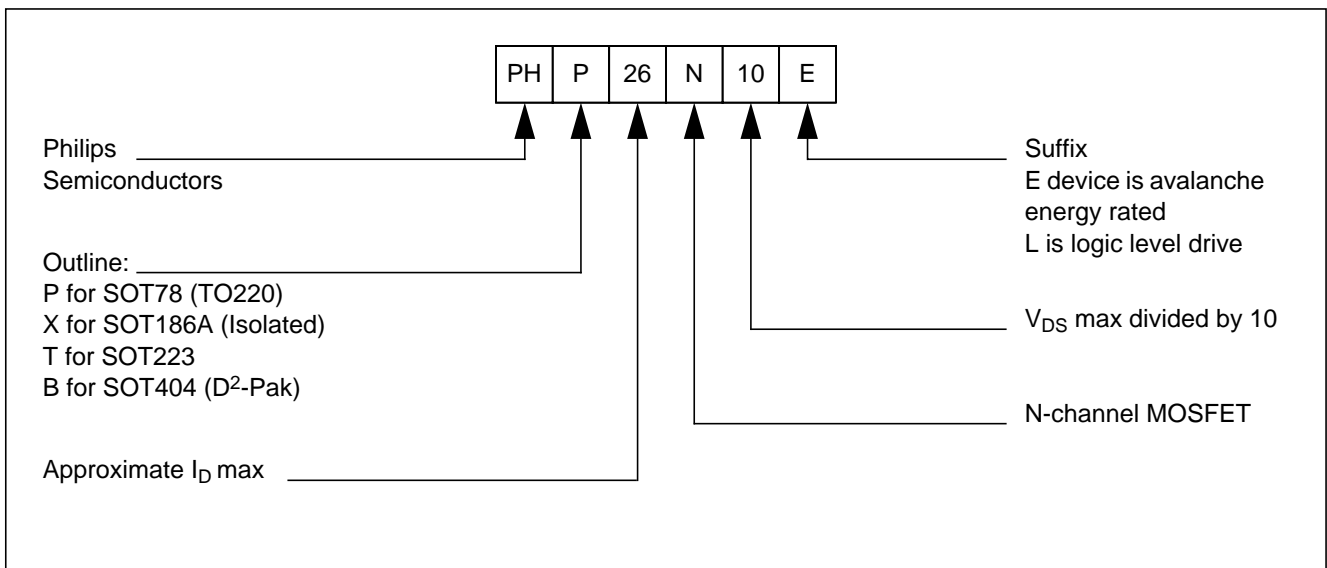
Example: BUK7508-55 is a standard level TrenchMOS™ device in a SOT78 with an  $R_{DS(on)}$  maximum rating of 8mOhms and a 55V maximum drain-source rating.

DIGIT	1st	2nd	3rd
CODE	TECHNOLOGY	OUTLINE	CHIP SIZE (mm <sup>2</sup> )
0	(-)	(-)	(-)
1	L.S. TOPFET	(-)	2
2	H.S. TOPFET	SOT428	4
3	(-)	(-)	6
4	NMOSFET	SOT186	8
5	L <sup>2</sup> FET	TO220AB	14
6	(-)	SOT404	20
7	STD TRENCH	SOT186A	25
8	IGBT	SOT223	36
9	L <sup>2</sup> TRENCH	SOT262	42

#### c) PHP style type numbers

A new range of products has recently been released under this scheme which is designed for easy cross reference to industry standard type numbers.

There is one notable exception to this scheme - the PHP3055E family. For historical reasons this industry standard device does not conform



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### FEATURES

#### Higher maximum junction temperature

All of the low voltage types (up to 200 V) in TO220AB outlines are now published with  $T_j(\text{max})$  of 175 °C.

#### Logic level gate

This range of products has logic level gate drive. These can be fully switched on with a VGS of only 5 V and is therefore compatible with standard digital integrated circuits.

#### Ruggedness

The majority of the products in this book are 100% tested to guarantee the published avalanche energy rating.

#### Application information

Application information for power MOS devices and other Philips Semiconductors power products is published in the power Semiconductors Applications Handbook. The order code for this publication is; 9398 652 85011

The Applications Handbook contains information on the theory of power transistors and diodes in typical applications such as SMPS and TV deflection circuits. Examples are included to support the theory.

A number of other useful technical publications and cross reference guides are available through our fact sheet system.

### NEW PRODUCTS

Philips Semiconductors are working intensively on bringing new products to the market in PowerMOS and related technologies. These are the new products and technologies that appear for the first time in this data handbook.

#### TrenchMOS™

TrenchMOS™ is Philips Semiconductors' revolutionary new MOSFET design which delivers extremely low  $R_{DS(\text{On})}$  performance. Compared with the standard DMOS process, TrenchMOS™ achieves reductions of up to 55% in  $R_{DS(\text{on})}$  performance. This translates into significant benefits such as improved current handling, die size reductions and lower power dissipation. TrenchMOS™ allows the same current handling capability to be achieved with a die size two thirds the traditional DMOS size.

This is possible since the lower  $R_{DS(\text{on})}$  value offsets the increased thermal resistance of a smaller die area. The process also offers rugged avalanche capability and excellent reliability. All Philips TrenchMOS™ devices have built in ESD protection.

#### Surface Mount Power- SOT404/SOT426 outlines

SOT404 is the Philips surface mount equivalent to the very popular SOT78 (TO220) package. The introduction of SOT404 again underlines Philips commitment to surface mount technologies. SOT404 is a purpose designed surface mount package with many design differences over the SOT78 (TO220) through hole package. SOT404 has selective plating on a specifically designed leadframe, revised die attach methods, and a new plastic compound ideally suited to the demanding environment of surface mount.

SOT404 is a three pin package and is complemented by the SOT426, a five pin version which is particularly relevant for the TOPFET range of devices.

#### Commodity PowerMOS range

An extended range of PowerMOS devices under the new PHP style type numbering scheme described in the last section. The new types are designed as close equivalents to types widely accepted as industry standard. The choice of part numbering strongly underlines this strategy.

#### Medium Voltage PowerMOS

In recent years Philips Semiconductors has not been focused on the medium and high voltage MOSFET market. We define this area as those MOSFETs with a  $V_{DS(\text{max})}$  of 400 V and up. As a direct result of increased capacity and market focus we have redesigned our medium voltage range to re-address this market. Objective specifications for the first range of devices are included for the first time in this edition of SC13, comprising devices in TO220, SOT186A and SOT223 outlines. A number of range extensions are planned for 1997. The new range all carry a 'ruggedness' rating which is specified in the data sheets as a maximum unclamped inductive load turn-off energy.

These new releases demonstrate our commitment to enhancing our position as a broad range Power Semiconductor supplier.

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